Contribution ID: **156** Type: **not specified**

D. Silva: Signatures of spherically symmetric distributions of dust

Tuesday 20 December 2022 16:45 (15 minutes)

Collapsing stars may be approximated by homogeneous distributions of dust, either in the form of massive spheres or thin shells. Furthermore, using modern mathematical techniques, the dynamics of these systems may be obtained by separating spacetime into interior and exterior regions, focusing on the boundary conditions and thus foregoing solving the field equations for the totality of spacetime. Although these approximations deny the complexities of stellar dynamics, they allow analytic solutions and these still exhibit several signatures associated with absolute contraction. Additionally, these solutions can be obtained for any case, whether starting from a finite or infinite distance, at rest or with initial velocity. One particular case, of increased physical interest, is that of a distribution of matter starting collapse at rest from a finite distance. Using the analytic solution for this case we trace the evolution of collapse and we build the causal structure of spacetime for all observers: the interior, the one falling with the star and the exterior. We also identify the events that emerge with contraction: the formation of the apparent and event horizons, and subsequently of the region of trapped surfaces and singularity at the center. While these features are hidden away from external observers by the event horizon, we show the profile of the redshift for a distant static observer to follow a specific profile. Doing so, contraction is fully characterized for this case.

Session Classification: Session 8 B